Learning Objectives

Upon completion of this module, the student will be able to:

- Describe the recent trends and differentials in mortality
- List and describe the proximate and underlying determinants of morbidity and mortality
Relations Among the Demographic, Epidemiologic and Health Transitions
Life Expectancy Gains in Major World Regions, 1950-55 to 1995-00

- **N. America**: 69 → 76.9
- **Europe**: 66.2 → 73.3
- **L. America**: 51.4 → 69.2
- **Asia**: 41.3 → 66.3
- **Africa**: 37.8 → 51.4
The Structure of Mortality

High Mortality

Young Age Structure \rightarrow Infectious Diseases

Low Mortality

Older Age Structure \leftrightarrow Chronic Diseases
Matlab, Bangladesh

Percent distribution of population and deaths, 1987

Data Source: ICDDR,B
Sweden

Percent distribution of population and deaths, 1985

Data Source: Keyfitz and Flieger, 1990
Proportions of Deaths Due to Communicable and Non-communicable Diseases and to Injuries; Europe and Africa, 1998

(Source: WHO, World Health Report, 1999)
Age and Cause Distribution of Deaths in Chile for Females 1909 and 1999

Source: Fig 1.1, World Health Report, 1999
Determinants of Variations in Morbidity and Mortality

- **Proximate determinants**: Factors that directly influence the risk of disease and the outcomes of disease processes in individuals.

- **Distal (underlying) determinants**: Social, economic, and cultural factors that influence the health status of a population by operating through one or more of the proximate causes.
Proximate Determinants Of Morbidity and Mortality

- **Personal behaviors**: Diet, hygiene, alcohol and tobacco use, sexual behavior, etc.

- **Environmental exposures**: Exposure to infectious or chemical or physical agents, occupational hazards, etc.

- **Nutrition**: Under nutrition, micronutrient deficiency, over nutrition/obesity etc.

- **Injuries**: Intentional or accidental injuries.

- **Personal illness control**: Specific preventive and sickness care actions.
Underlying Determinants Of Morbidity and Mortality

- **Socio-economic factors**: Household wealth, community development, women’s education and employment, etc.

- **Institutional factors**: Health systems, health regulations, technological developments, information programs, environmental interventions, etc.

- **Cultural factors**: Traditional beliefs about health and disease, religious values, role and status of women etc.

- **Broader context**: Ecological setting, political economy, transportation and communication systems, agricultural development, markets, urbanization, etc.
A Determinants of Morbidity and Mortality Framework

Socio-economic, cultural and institutional factors

- Health behaviors
- Environmental exposure
- Nutrition
- Injury

Healthy

Sick

Death

Personal illness control

Prevention

Treatment

(Adapted from Mosley and Chen, 1983)
This concludes this lecture. The key concepts introduced in the lecture include:

- Health transition
- Regional trends in life-expectancy gains
- Proximate and distal determinants of variations in morbidity and mortality
Mortality and Morbidity Trends and Differentials
Determinants and Implications for the Future

Module 7b
Upon completion of this module, the student will be able to:

- Analyze the relationship between indicators of development and health
Income and Health – What Are the Relationships?

- Historically – a dual relationship

1. In a specific time period (e.g., 1900, 1930, 1960) higher incomes were associated with higher life expectancies.

2. Over several decades, however, the same level of income was associated with a higher level of life expectancy.

3. This gain in life expectancy over time without a corresponding change in income has been termed a “structural shift” by economists.
“Structural shift” in the relationship between life expectancy and income, 1930-1990


Source: Fig 1.4, World Health Report, 1999
Income And Mortality: Explaining The Historical Relationships

Moving along the income/survival curve: Achieved by reducing health risks and being able to utilize the existing services more effectively with higher incomes.

Shifting to a higher income/survival curve: Achieved by access to low cost and better health technologies (vaccinations, antibiotics, safe water and sanitation, vector control campaigns, information, etc.).

- This was responsible for almost half of the gains in health between 1952 and 1992 in LDCs (WHO).
### Selected Developing Countries with High or Low Average Life Expectancies Relative to GNP Per Capita

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<td><strong>A. Life expectancy over 70 years with GNP/capita under $2,000</strong></td>
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<tr>
<td>Sri Lanka</td>
<td>420</td>
<td>71</td>
<td>2.5</td>
<td>81</td>
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<td>Chile</td>
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<td><strong>B. Life expectancy under 65 years with GNP/capita over $2,000</strong></td>
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<tr>
<td>Saudi Arabia</td>
<td>6,200</td>
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<tr>
<td>Algeria</td>
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<td>5.4</td>
<td>35</td>
<td>63</td>
</tr>
</tbody>
</table>

(Source: Mosley and Cowley, 1991)
Female Education And Mortality

- The Demographic and Health Surveys have documented a consistent relationship between higher maternal education and lower levels of mortality among children under 5 years of age.
- This has been observed in countries in Africa, Asia and Latin America.
Under-five mortality rates by mother’s education in the period 0-9 years preceding the survey, 1990-1999, DHS, SSA
Female Education And Mortality

Almost one-third of global health gains as measured by mortality reduction in the period 1960-1990 are attributed to gains in female education.

This is been shown to operate in part through more educated mothers being able to reduce health risks and being better able to access modern health services.
This concludes this session. The key concepts introduced in the lecture include:

- Relationship between income and health
- Relationship between woman’s education and health
Mortality and Morbidity Trends and Differentials

Determinants and Implications for the Future

Module 7c
Learning Objectives

Upon completion of this module, the student will be able to:

- Explain what is meant by the Health and Epidemiologic Transitions and Epidemiologic Polarization and what are the implications for the future
The Epidemiological Transition: Elements

- Shift in age structure of the mortality; from younger age groups to older age groups
- Change in patterns of mortality and morbidity by cause of death; from infectious diseases to non-communicable diseases
The Epidemiological Transition: Historical Stages

- The age of pestilence and famine
  - Precedes the mortality transition; LE = <40yrs

- The age of receding pandemics
  - Less variation in mortality with steady decline

- The age of degenerative or human-made diseases
  - Life expectancy reaches 70 years and above

(Source: Omran, 1971)
The Epidemiological Transition: The Future?

- The age of delayed degenerative diseases?
  - With health advancements, chronic diseases are postponed to much later in life.

- The age of emerging/re-emerging infectious and parasitic diseases?
  - New infectious diseases (such as HIV/AIDS) may continue to appear and old diseases return because of antibiotic resistance and compromised immune systems among the elderly.
Epidemiological Polarization

- Widening of the gap in the health status among social classes or geographical regions due to unequal distribution of gains of development and incomplete/unequal coverage of health interventions.
Epidemiological Polarization

- Can refer to widening of the health status gap between countries or between social groups within a country
- Characterized by overlap of eras; persistence of infectious diseases with emergence of non-communicable diseases
- Observed in the developed and developing countries alike.

continued
Epidemiological Polarization

Mortality “reversals” due to economic collapse, wars and emerging epidemic diseases can be factors causing widening gaps across countries. Examples are:

- Economic collapse – Russia (Former Soviet Union)
- Wars – Former Yugoslavia, Rwanda
- Emerging epidemics – HIV/AIDS in Sub-Saharan Africa
Projected Effect of AIDS on Life Expectancy in Sub-Saharan Africa by the Year 2010

Source: U.S. Bureau of Census International Programs, 1997
Population Aging and “Compression” of Mortality and Morbidity

- Compression of mortality: Increasing concentration of deaths at upper ages
  - Is there an upper limit to life expectancy?
- Compression of morbidity: An increasing concentration of illness and disability in the latter years of life with fewer years of disabled life before death among the elderly
  - Are health gains matching or exceeding gains in survival?
Compression of Morbidity with Gain in Life Expectancy

No compression of morbidity

Compression of morbidity

Years lived

Healthy  Morbidity  Disabled
Population Aging and “Compression” of Mortality and Morbidity

- If there is no “compression” of mortality, and no postponement of morbidity, then life expectancy may steadily increase but years lived with morbidity and disability would also increase.
- This can result in growing numbers of chronically ill and disabled elderly, creating an increasing burden on health systems.
This concludes this lecture. The key concepts introduced in this lecture include:

- Epidemiological transition
- Epidemiological polarization
- Compression of mortality and morbidity